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REGION III
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Philadelphia, Pennsylvania 19103-2029

Colonel Robert D. Peterson
District Engineer
Huntington District
U.S. Army Corps of Engineers
502 Eighth Street
Huntington, West Virginia 25701-2070

Re: PN 2003-00238-KAN; Alex Energy Inc.; Republic No. 1 Surface Mine; Kanawha County; West Virginia

Dear Colonel Peterson:

This letter follows up EPA's letters dated April 3, 2009 and April 28, 2009 pursuant to Part IV of the 1992 Clean Water Act Section 404(q) Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army regarding the above-referenced Public Notice for the proposed Republic No.1 Surface Mine. In those letters, EPA identified specific concerns regarding the adverse effects of proposed discharges associated with the proposed project and non-compliance with the Clean Water Act Section 404(b)(1) Guidelines. EPA also made recommendations to the Corps and the applicant identifying actions for addressing EPA's concerns. In October, 2009 EPA met with the applicant and the Corps to discuss the Agency's concerns. Recently, Alex Energy provided a response to the Agency's comments. EPA has reviewed the applicant's response and offers the following comments. In the near future EPA intends to forward proposed permit conditions that would resolve several of the comments below.

The Clean Water Act Section 404(b)(1) Guidelines (40 C.F.R. Part 230) provide the substantive environmental criteria against which this application must be considered. Fundamental to the Guidelines is the premise that no discharge of dredged or fill material may be permitted if: (1) it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable state water quality standard; (2) a practicable alternative exists that is less damaging to the aquatic environment; or (3) the nation's waters would be significantly degraded. On April 1, 2010, EPA released interim final guidance to the Regional offices titled: Guidance on Improving EPA Review of Appalachian Surface Coal Mining Operations under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order (SCM Guidance). The SCM Guidance provides a framework for the Regions applicable to review of permits

for discharges associated with Appalachian surface coal mining projects. While provided before issuance of the SCM Guidance, we believe EPA's April 2009 letters identified the same types of water quality and environmental issues addressed in the the SCM Guidance.

Also on April 1, 2010, EPA released two Office of Research and Development (ORD) reports: The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields and A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams (Benchmark Conductivity Study). The ORD reports are being submitted to the EPA Science Advisory Board (SAB) for review and are also publicly available. In the interim, EPA views the reports as providing information, along with published, peer-reviewed scientific literature, that informs the review of this proposal.

Recommendation that additional opportunities for avoidance and minimization be evaluated – 40 CFR 230.10(a) & (d)

Prior to EPA's April 2009 letters, Alex Energy had reduced the linear extent of impacts to waters of the U.S. by 4,488 linear feet from the original application in 2003. The applicant had eliminated one valley fill by proposing to place the fill material in two side fills that are proposed to be constructed on top of an existing refuse pile in Abbott's Hollow. The applicant also represents that it has redesigned Ponds 32 and 35 to move them as close as practicable to the toes of the fills.

We commend the efforts undertaken by the applicant to address the direct impacts due to the fills through additional avoidance measures. Nevertheless, the applicant has not addressed the concern expressed in our April 2009 letters that there appear to be additional measures that should be considered to avoid or minimize adverse effects to the downstream waters. The concepts of least damaging practicable alternative and avoidance and minimization extend beyond the footprint of the fill and include the need to consider alternatives, including best management practices or alternate mining techniques, that will minimize the effects of the fill on the aquatic ecosystem. (See, e.g., 40 CFR Sections 230.10(a) & 230.10(d)). The applicant has indicated that the remaining valley fills will be constructed in the same manner as those typically constructed in Southern West Virginia. The best information available to EPA indicates that valley fills constructed in this manner result in adverse effects to the aquatic ecosystem including elevated levels of total dissolved solids and conductivity. In their documentation the applicant acknowledges that high conductivity can be ameliorated by appropriate mining practices. There is no indication, however, that such alternative mining techniques have been considered. EPA recommends that the project's reasonable potential to cause or contribute to excursions from applicable water quality standards and/or significant degradation of the aquatic ecosystem be evaluated and addressed. Alternative mining techniques or best management practices that will be protective of water quality and prevent significant degradation of the aquatic ecosystem should be considered and the record of decision should include documentation about their potential use and likely effectiveness in protecting the impacted streams and the downstream receiving waters.

Recommendation that the project's reasonable potential to cause or contribute to excursions from applicable water quality standards and/or significant degradation of the aquatic ecosystem be evaluated and addressed -- 40 CFR 230.10(b) & 230.10(c)

40 C.F.R. Section 230.10(b)(1) of the CWA Section 404(b)(1) Guidelines states that “no discharge of dredged or fill material shall be permitted if it causes or contributes, after consideration of disposal site dilution and dispersion, to violation of any applicable State water quality standard.” The Guidelines, at 40 C.F.R. Section 230.10(c) also prohibit any discharge of dredged or fill material which would cause or contribute to significant degradation of the aquatic ecosystem, with special emphasis placed on the persistence and permanence of effects, both individually and cumulatively.

EPA continues to be concerned that the project may cause or contribute to water quality impairment and/or significant degradation by increasing the levels of total dissolved solids and conductivity in the receiving waters. While the applicant represents that the project will not cause or contribute to already existing impairments of numeric water quality standards in Cabin Creek, Fifteenmile Fork or Abbott's Creek, the applicant does not address EPA's concerns regarding West Virginia's narrative standard (Conditions Not Allowable, CSR Sections 47-2-3.1, 3.2, 3.2e. and 3.2.i). The best information available to the Agency, including published, peer-reviewed studies, indicate the activities proposed by the applicant, i.e., surface mining with valley fills in Central Appalachia, are strongly correlated to downstream biological impairment, as indicated by raw taxonomic data, individual metrics that represent important components of the macroinvertebrate assemblage, or when multi-metric indices are considered. These studies show that surface mining impacts on aquatic life are strongly correlated with ionic strength in the Central Appalachian stream networks. Downstream of valley fill overburden disposal sites specific conductance and component ions can be elevated as much as 20 to 30 times over the background levels observed at un-mined sites. This increase in conductivity impairs aquatic life, is persistent over time, and cannot be easily mitigated after-the-fact or removed from stream channels. These aquatic life impairments can rise to a level of significant degradation and/or may result in a violation of West Virginia's narrative and numeric water quality standards.

The recent EPA Office of Research and Development Benchmark Conductivity Study has identified a protective conductivity level of 300 $\mu\text{S}/\text{cm}$ that is applicable to the ecoregion in which this project is located. Based on this report and other best available information, EPA expects conductivity impacts of projects with predicted conductivity values below 300 $\mu\text{S}/\text{cm}$ generally are not likely to cause water quality violations or significant degradation of the aquatic ecosystem. Conversely, discharges with levels of conductivity above 500 $\mu\text{S}/\text{cm}$ generally are likely to be associated with adverse impacts that could cause or contribute to significant degradation and/or excursions from narrative water quality criteria.

EPA recognizes that in certain fact-specific circumstances in-stream conductivity levels greater than 500 $\mu\text{S}/\text{cm}$ may not cause adverse impacts to the biological community. To the extent the applicant believes that to be the case with this project the applicant should supply an analysis of the ionic matrix and whether the discharge is dominated by calcium, magnesium, bicarbonate and sulfate and low in chloride. Limestone-dominated in-stream background conditions should also be noted. In addition, the applicant should provide an analysis of whether the native aquatic community is similar to that studied in the Benchmark Conductivity Study and

in Pond, G.J., M. E. Passmore, F.A. Borsuk, L. Reynolds, and C. J. Rose. 2008, Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools, J. N. Am. Benthol. Soc. 27(3):717–737. Any analysis based on differences of the native aquatic community should include a review of taxa (at the genus level) at applicable reference sites within the region.

While the applicant has provided data purporting to demonstrate that elevated levels of conductivity do not generally have an adverse effect, the data and studies submitted by the applicant do not demonstrate that the expected discharges from this project or the native biota in the receiving stream differ from those in the studies above. Moreover, the data and studies submitted by the applicant do not support the general conclusions drawn by the applicant. In addition to comments provided under this and the next subheading, EPA is providing technical comments on these studies as an enclosure.

The applicant is correct that some of the streams within the project area are degraded due to past mining practices; however, that fact does not obviate the Section 404(b)(1) Guidelines' prohibition on discharges that cause or contribute to water quality impairment or significant degradation of the aquatic ecosystem. Moreover, the data provided by the applicant shows that not all of the streams within the project area are degraded (for example, Pond 32, Toe of VF 1), and some areas appear to be fully supporting the designated use using the West Virginia Stream Condition Index (WVSCI). In fact, based on the datasets provided, some of the streams draining the proposed fills are lower in specific conductance than the larger receiving streams, and are providing dilution potential. In addition to the impacts on the immediate receiving waters, dissolved solids would remain in solution as water flows through AMD (acid mine drainage) degraded areas and into receiving waters further downstream.

The data provided does not fully support the applicant's assertion that, based on variability, WVSCI scores for this watershed would be an unreliable indicator of violation of West Virginia water quality standards. It appears that at least some of the variability in the data set may be attributable to the applicant's collection and analysis. The applicant has calculated WVSCI scores in time periods that are at the extreme end or out of the range of the WVSCI calibration period. EPA recognizes that there is seasonal variability in WVSCI scores, and the WVDEP in its WVSCI document states that the index could be improved by restricting sampling to spring and summer. The WVSCI was calibrated within an April to October index period with those two months being on the outer extremes. Variable WVSCI scores would be most likely in April and October. The January WVSCI samples collected by the applicant are difficult to interpret as WVSCI was not intended to be used at that time of year. In addition, applicant's data tables often show more than 1,000 organisms were sampled. It is unclear whether all of these organisms were used by the applicant in the WVSCI calculation, and EPA notes that use of WVSCI requires a 200 organism subsample.

In addition to impacts on the native biota, elevated conductivity and the creation of sediment ponds associated with construction of Alex Energy Republic No. 1 may contribute to conditions that could support golden algae, *P. parvum*, that releases toxins that kill fish and other gill-breathing aquatic organisms. *P. parvum* is associated with a severe aquatic life kill in Dunkard Creek, West Virginia and Pennsylvania in September 2009. The identification of *P. parvum* in 2009 in Dunkard Creek, on the Pennsylvania and West Virginia border near Morgantown, WV, was the first identification of this invasive aquatic species in the Mid-Atlantic

States. The factors that are most closely associated with this risk are believed to include:

Proximity to a known source of *P. parvum*.

TDS in high enough amounts to support *P. parvum* (estimated to be between 500 and 1000 mg/L (conductivity 714-1428 uS/cm).

Nutrients of great enough amount to initiate a bloom of *P. parvum*

pH greater than 6.5. Risk increases with increasing pH.

Habitat areas that are pooled (large beaver dams, natural residual pools, or manmade ponds)

Cabin Creek, which is in the vicinity of Abbott Creek and the proposed project site were identified by WVDEP as harboring *P. parvum*. The Alex Energy Republic No. 1 mine as proposed will construct sedimentation ponds, thus adding to pooled water in the area and as discussed above is likely to increase levels of TDS/conductivity in its receiving waters, thus creating conditions more favorable to golden algae.

To ensure that the project will not cause or contribute to significant degradation, EPA recommends that the Clean Water Act Section 404 permit include a threshold level of no greater than 500 μ S/cm in discharges from the sediment control structures in order to protect the biological integrity of benthic communities in downstream surface waters. EPA strongly recommends “sequencing” construction of those valley fills deemed necessary and acceptable after appropriate minimization and avoidance efforts are documented. This is to ensure consistency with 40 CFR Sections 230.10(b) & (c). In this context, the term “sequencing” refers to construction of one valley fill before remaining valley fills are approved to provide the opportunity to demonstrate that mining related activities have not caused or contributed to significant degradation and/or an excursion from applicable water quality standards before the applicant proceeds to construction of remaining fills. Any proposal that moves forward should include a monitoring plan and data evaluation process to identify the impacts that may be occurring to the aquatic ecosystem, and an adaptive management plan for remediation and prevention of further impacts. We will be sending under separate cover proposed permit conditions that would implement 40 CFR Sections 230.10(b) and (c), including sequential construction of the valley fills.

Recommendation that mitigation replaces the lost functions and services of the impacted streams – 40 CFR 230.10(d)

In general, EPA continues to have concerns that the linear footage of permanent and temporary impacts to be mitigated is inaccurate and recommends a re-evaluation of all stream channels within the permit boundaries. According to the WVDEP’s Buffer Zone Analysis, the upstream drainage areas of the toes of the proposed fills range from 96 to 133 acres. Research in Central Appalachia (USGS 2003) shows that perennial flow may exist where the upstream drainage area is as small as 40 acres. EPA’s research supports this conclusion. EPA has found obligate aquatic organisms carrying out their life cycle (greater than 6 months) in streams with catchment areas less than 15 acres in the Appalachian coalfields of West Virginia and Kentucky.

The flow regimes of the impacted resources also may be inaccurately characterized due to conditions under which the baseline data was collected. The baseline data collection for the stream mitigation plan was conducted in October 2007, a sustained period of abnormally dry-to-severe drought conditions, which can result in mischaracterization of typical baseline flow

conditions. The CMP also contains numerous examples of inconsistent data. An example is data from Table 6-6 on Abbo Upstream and Downstream Reference Fill 2 sites, and Pond 34 (below VF3) were characterized as intermittent but were flowing during the drought period (October 15, 2007). This is inconsistent with previous information.

EPA believes that mitigation must replace the lost functions and services of the impacted streams. In addition to recommending a re-evaluation of the impacted stream channels to establish a more accurate linear footage of impacts, EPA recommends that full mitigation credits should not be granted for the applicant's proposed use of down dip sediment ditches and creation of hydrologic connectivity channels through the conversion of National Pollutant Elimination System (NPDES) outlets to create 11,100 linear feet of stream channel. The applicant proposes that these constructed channels would replace permanent impacts associated with the mine at a ratio of nearly 1:1 linear feet of impacts to linear feet of mitigation. The topographic maps, however, indicate that some of the hydrologic connectivity channels will travel down-gradient within already formed jurisdictional waters (for example, 1,300 feet within Reach 014). Accordingly, it is not clear that this proposal represents attempts at true stream creation. Moreover, it is likely that the connectivity channels will export pollutants. Both in the short-term and the long-term, increased storm flow and effluent through the NPDES outlets and into natural channels will potentially increase sedimentation to downstream receiving waters through erosive downcutting in receiving channels not developed to handle increased runoff. The CMP also lacks assurance that the connectivity channels will result in a stable Rosgen classification.

The applicant relies on a Technical Memorandum titled "Ecological Function in Created Streams" and another study submitted called "Recovery of Streams Downstream from Surface Mining at the Mammoth Coal Company and Martin County Coal Mine Sites" (prepared for Alex Energy, Inc. by Ecology and Environment, Inc.), to support its assertion that the proposed mitigation will successfully compensate for the impacted resources. The conclusions drawn from these submissions are not supported because, among other reasons, the studies lack comparison to appropriate reference stream(s). More detailed technical comments responding to these submissions are enclosed.

EPA continues to recommend that the permit require compensation for all impacted resources. The applicant has used functional assessment methods to assess the impacted streams and has conducted chemical and biological sampling. It is our understanding that the same methodologies will be used to monitor the created stream channels. The applicant, however, has represented that macroinvertebrates will be collected for monitoring purposes, but will not be used as an indicator for success. Any permit authorized for this project should include physical, chemical and biological success criteria. At a minimum the created channels must not export pollution. The specific conductivity in these channels should be no greater than 500 $\mu\text{S}/\text{cm}$, and the created channels should support a biological community with a WVSCI score of 68, assuring that these created waters of the U.S are meeting the designated use for aquatic life and not being listed in the future on the State's Clean Water Act 303(d) list.

Recommendation that a thorough analysis of the potential cumulative effects on the watershed be developed and considered – 40 CFR 230.1(c) & 230.11(g)

EPA recommends that a thorough analysis of the potential cumulative effects on the watershed be developed and considered. The Section 404(b)(1) Guidelines require

consideration of cumulative impacts: "Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." (40 CFR Section 230.1(c)). "[A]lthough the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of the existing aquatic ecosystem." (40 CFR Section 230.11(g)).

The applicant's cumulative effects analysis was limited in scope and provided a limited analysis of past, present, and reasonably foreseeable future impacts. The applicant proposes to study cumulative impacts of the project while the project is ongoing, rather than at the outset prior to authorization. The applicant proposes to collect data during operation of this mine and the results will provide an indication of the cumulative effects of the Republic No. 1 Surface Mine activities on the Cabin Creek watershed.

To ensure that cumulative impacts associated with this project are adequately addressed prior to authorization, EPA recommends that the Corps conduct a thorough cumulative effects analysis which includes a detailed presentation of past, present and reasonably foreseeable activities. The analysis should describe the current state of the aquatic ecosystem and consider the effects on the human environment including impacts to the subwatershed from the filling of streams that currently provide freshwater dilution and potential impacts to private drinking water wells and other drinking water supplies. This analysis should include, at a minimum, the cumulative effects of all reasonably foreseeable activities on water quality, loss of stream function and habitat, and the effects of the hydrologic modifications to the watershed. It should also address the impact of deforestation on water quality, water quantity, and overall ecological conditions within the watershed.

The applicant proposes to construct a passive wetland treatment system to address an acidic seep that flows into Fifteenmile Fork at the mouth of Abbott Creek. Because the passive wetland treatment system is intended to offset temporal impacts, the applicant proposes to maintain it only through bond release. EPA appreciates the efforts of the applicant to address a major source of water quality impacts, acid mine drainage, within the sub-watershed through the proposal to create a passive wetland treatment system. This proposal, should it be maintained in perpetuity, could address significant cumulative impacts in the sub-watershed. EPA is concerned about the potential temporary nature of this project as it is proposed to only be maintained through bond release. Maintenance of this system in perpetuity is recommended.

Finally, consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) and NEPA analyses consider impacts to the affected community, including impacts to water supplies and fisheries and ensure meaningful increased opportunity for public input regarding potential impacts.


Conclusion

In conclusion, EPA reiterates the concerns stated in its April 3 and 28, 2009 letters. EPA recommends that the applicant provide documentation consistent with our comments. As noted above, we are recommending additional analysis regarding alternative mining techniques, cumulative impact, and environmental justice. In addition, we believe that it may be appropriate for the District to prepare an Environmental Impact Statement (EIS) as part of the decision-making process for this permit application. In particular, given our concern regarding the proposed mitigation for this project, it is not clear that the anticipated impacts from the project will be mitigated to a level that would serve as a basis for supporting a Finding of No Significant Impact. We would appreciate the opportunity to discuss with you this issue of whether an EIS should be prepared, as well as our other concerns with the permit application.

We will be sending under separate cover proposed draft permit conditions that would address some of these concerns. We remain willing to work with you and the applicant to address the concerns described herein and in our April 3 and 28, 2009 letters. We are prepared, however, to follow the 404(q) elevation process if we believe that there remains inconsistency with the Section 404(b)(1) Guidelines.

Thank you for the opportunity to provide these comments. Should you have any questions please feel free to contact Ms. Jessica Martinsen at 215-814-5144 or by email at martinsen.jessica@epa.gov

Sincerely,


John R. Pomponio, Director
Environmental Assessment and Innovation Division

Enclosure

Comments on 2008 study entitled “*Recovery of Streams Downstream from Surface Mining at the Mammoth Coal Company and Martin County Coal Mine Sites*” submitted on behalf of Alex Energy.

The objective of this study was to measure ecosystem functions in streams affected by mountaintop removal/valley fill coal mining. Seven stream locations were chosen at the Mammoth Coal Co. site in Kanawha Co., WV and four locations were chosen on the Martin Co. Coal Mine site in KY. Ten of the eleven stream sampling sites were located downstream of at least one valley fill and fills varied in age from 10 to >30 years old. The remaining stream site (MA-07) did not have valley fills above, but there has been historic contour mining in headwaters.

- The experimental design is flawed by the absence of an appropriate reference stream(s) since all sites were impacted by some mining disturbance. To properly assess stream functions the natural range of functions in reference (or least disturbed) streams must first be determined. There were also no statistical comparisons of any sort with the one unfilled stream site and no real comparisons between the Mammoth and Martin Co. locations. Data for many parameters were not provided by individual stream, but merely summarized as mean and range by study location (KY and WV).
- It seems one objective of the study was to document recovery over time by measuring functions below valley fills of different age, yet this factor was also ignored and no comparisons were made. Better designs would have stratified sites by age of fill rather than study location or by both age and location.
- Many of the functions included in the report, and the means of measurement, are unclear and suspect. Most measures were indirect (e.g. RBP scores) and make large assumptions when relating to actual stream functions. Elevated ion concentration across all mined sites was a major finding of the work, yet there were no statistical correlations of any sort between abiotic and biotic data. Very few details were provided on sampling methods for most of the included parameters.
- Results of the November benthic samples are misleading because this is the time of massive egg hatch of winter stoneflies (Capniidae and Taeniopterygidae) where thousands of early instars larvae dominate the sample, exhibiting a “boom” population of *r*-selected (e.g., opportunistic) species. This sampling time is not recommended by either KY or WV standard operating procedures. These ubiquitous winter stoneflies, while somewhat sensitive to organic pollution, are quite tolerant of ionic stress and metals and positively respond to increased water hardness. The assigned Hilsenhoff tolerance values (used for HBI) are not reflective of their tolerance in Appalachian streams. Furthermore, calculation of HBI based on 2,250 capniid stoneflies leads to an overestimate of this metric; capniids represented 86% of the Jones Branch (MC-03) sample. HBI was not intended to be used with these full counts and the metric score is invalid.
- The characterization of the Mammoth and Martin sites is problematic. The applicant refers to the overall assemblage of macroinvertebrates collected as sensitive, while the majority of the taxa are facultative to tolerant. The WVSCI

may not have been applied properly as it appears that component metrics used full counts instead of the 200 subsample. Even so, many of the sites sampled would still be considered impaired and reported on WV's or KY's 303d list.

- In contrast to the applicant's dataset, KY Division of Water data from Venters Branch (applicant's MC-04) indicated severely impaired conditions in early spring 2004, despite adequate downstream habitat conditions 10 years after mining and valleyfill construction. Specific conductance was $>2000 \mu\text{S}/\text{cm}$ and no mayflies were collected. EPA Region III sampled this same site in June 2008 and July 2009 (now approaching 15 y after reclamation) and recorded specific conductance $\sim 2500 \mu\text{S}/\text{cm}$ with a highly impaired benthic community and toxic conditions based on a 7d chronic *Ceriodaphnia dubia* test using EPA method 1002 and reproductive endpoints. Jones Branch was also sampled by EPA in 2009, in the immediate vicinity of the applicant's station. This site was also severely impaired and stream water also exhibited sub-lethal toxicity to *C. dubia*. Observations such as these raise questions regarding the conclusions drawn by the applicant.
- It was concluded that the study streams met 10 of the 11 functions, with the exception being water purification because of elevated ion concentrations. The authors claim the significance of elevated ions is uncertain and they provide no explanation, though they acknowledge that some research has suggested high ion concentrations can adversely affect benthic communities. Here, however, they claim this is not the case given the abundant and diverse macroinvertebrate communities at the study sites. This conclusion cannot be supported in the absence of an appropriate reference site and the lack of data summary in the report. The benthic tables at the back of the report, however, do seem to indicate that many of these sites would be considered impaired, or moderately so, relative to forested streams of the region. Many of the metric values, particularly % Ephemeroptera, indicate degradation of the benthic community, yet these low values were not addressed in the report.

Comments on Technical Memorandum titled "*Ecological Functions in Created Streams.*"

This report attempts to provide, in part, examples of ecological comparability between natural and unnatural, re-created or re-located streams.

- The Anna Br. and Trace Cr. examples highlight the severe hydrological modification to natural stream networks despite the applicant's intention to document appropriate compensation. The water quality in these ditches is severely degraded and should conceivably receive negative (-) mitigation credit as they will contribute pollutants to downstream waters. As presented (i.e., for stream mitigation), the waterbodies are not attaining aquatic life uses based on the benthic communities reported.
- The Blue Branch study is **not** applicable to the permit under review. While the stream reach had been re-located, there was no mining nor any valley fills upstream of the study reach. Nevertheless, this example verifies that water

- quality can drive sensitive species more than habitat alteration. The chemical data suggested that the intact forested upland delivered water of very good quality (conductivity ~ 30 uS/cm) to the re-located site. Accordingly, the reach is not comparable to the proposed post-mining conditions.
- Station #12 on Abbott Creek was used by the applicant to document that many functions are being provided; however, the data reflects an impaired benthic invertebrate community is still impaired and the site is subject to potential listing on the 303d list. Replacement of riparian vegetation in this reach is unlikely to restore the aquatic community because water chemistry likely will remain degraded. We also disagree with the authors that temperature limited the mayfly and stonefly communities in this example. EPA is unaware of any data for temperature and chemical data for this reach. Furthermore, in other studies of stream impacts downstream of mining and valley fills, although temperatures can be elevated, temperature is never strongly correlated to impairment of the macroinvertebrate assemblage.
- The Coldwater Fork example demonstrates proper channel restoration techniques for a 3rd order stream draining a roughly 4000 acre watershed. Based on the size of the stream and the channel design techniques employed, this example is not comparable to the stream mitigation proposed for the Republic #1 surface mine project. Coldwater Fork has an impaired biological community from upstream MTM and valleyfills and is listed as impaired on KY's 303d list. It has a specific conductivity ~1500 µS/cm. Moreover, the reference sites used for biological comparisons were impaired sites as well, and it is ineffective to compare impaired streams with other impaired streams to document recovery following restoration. Unfortunately, the applicant mis-characterized and incorrectly used the KY multimetric index (MBI) and therefore the scores presented are not interpretable and their conclusions are unacceptable. According to the applicant, more data are available for review, but the website provided was not accessible without a password. Finally, there is no description of the fish Index of Biotic Integrity (IBI) that was used; this is necessary for review.